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ABSTRACT

This study evaluated the effectiveness of intensive instruction in reading decoding skills with 9th graders at risk for school failure or with learning disabilities. Sixty-two students were identified as reading more one or more grade levels below ninth grade in each of two high schools. Subjects in one school were removed from their English classes for 4 to 8 weeks, during which they received intensive small-group instruction in the Word Identification Strategy, a learning strategy for decoding multisyllabic words. Students in the comparison school received traditional reading instruction in their English classes. Results of posttests revealed that students with learning disabilities in the experimental school (n=11) had gained an average of 3.9 grade levels in reading decoding skills. Matched students in the comparison school had made an average gain of 0.4 of a grade level. The whole group of experimental students had made an average gain of 3.4 grade levels in reading decoding skills compared with an average gain of 0.2 in the comparison school. Results indicate that intense strategy instruction within a relatively short period of time can boost students' decoding skills by several grade levels. (Contains 10 references, 3 figures, and 3 tables.) (Author/DB)

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Research Report #15

The effects of an intensive reading intervention on the decoding skills of high school students with reading deficits

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and Donald D. Deshler

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Abstract

Results of previous research have indicated that high-school personnel tend to be more concerned about at-risk students than about students with disabilities. Nevertheless, both groups are entering high school with severe reading deficits. Many of them are reading around the fourth- and fifth-grade levels, while high school textbooks are written at the ninth-grade level and above. Observational data collected in special education classrooms indicate that special education teachers are not teaching students with disabilities the reading skills that they need in order to meet the reading demands of rigorous general education classes. Service delivery models are needed for quickly teaching students with disabilities and other at-risk readers the reading skills that they need. Thus, this study involved the identification of all students entering ninth grade in two high schools who were reading one or more grade levels below the ninth-grade level. Next, identified students in the experimental school (N = 62) were removed from their English classes for periods of time ranging between four to eight weeks, depending on the time required by each student to reach the mastery level. They received instruction in the Word Identification Strategy, a learning strategy for decoding multisyllabic words, in small groups of four to six students. Students in the comparison school received traditional reading instruction in their English classes. Results of the posttests revealed that students with LD in the experimental school (N = 11) had gained an average of 3.9 grade levels in reading decoding skills. Matched students in the comparison school had made an average gain of .4 of a grade level. The whole group of experimental students (N = 62) had made an average gain of 3.4 grade levels in reading decoding skills. Matched students in the comparison school made an average gain of .2 of a grade level. These results indicate that intense strategy instruction within a relatively short period of time can boost students' decoding skills by several grade levels.

In recent efforts at school reform, two major changes have been made. First, the complexity of what is taught has increased dramatically. This is nowhere more apparent than at the secondary level. Over the past decade, textbooks have become thicker, and the content in them has become more and more complex. In some cases, the content is similar in complexity to the content that is delivered at the college level. The readability level of these textbooks has increased with the complexity of the content as more and more difficult-to-read words are included in them. Along with the increase in the amount of content to be taught as represented by these changes in course textbooks, teachers of subject-matter courses feel like they are under pressure to teach more content than they have ever taught.

The second change, which is closely tied to the first, has been an increased emphasis on accountability within education. As a result, all of the states have adopted curriculum standards, and 48 states have created assessment tools to measure students' performance in relation to the standards that have been adopted (Council of Chief State School Officers,, 1998). In 46 of these states, student reading performance is assessed (Council of Chief State School Officers, 1999). In addition, 18 of these states have approved a policy stating that students must meet certain standards before they can be promoted to a certain grade and/or allowed to graduate from high school (Olson, 2000). Naturally, these changes in today's educational climate have implications for students who are at-risk for failure in required subject-matter courses and on state assessment exams. Indeed, research studies are showing that many students enrolled in general education subject-matter courses are failing those courses (e.g., Bulgren, Schumaker, Deshler, 1988) and that they are reading several years below grade level. For example, tenth-grade students with learning disabilities are reading, on average, at the fourth-grade level, completing math tasks at the sixth grade level, and writing at the fourth-grade level (e.g., Warner, Schumaker, Alley, & Deshler, 1980). Not surprisingly, a large proportion (38% on average and as high as 85% in some states) of students with disabilities are dropping out of school (Wagner, Blackorby, & Hebbeler, 1993). In California in 2001, 91% of students with disabilities (including students with learning disabilities) failed the math section and 82% of students with disabilities failed the language arts section of a high school exit exam (Egelko, 2002).

Since these data show that large numbers of students are not performing well in high school courses and on competency exams, instructional programs are needed that will help these students remediate their skill deficits. A useful program would, of necessity, be short in duration while being powerful enough to ameliorate deficits because high school students need to realize immediate gains if they are to succeed in required courses. Unfortunately, no such programs are widely used or available.

One instructional program that shows promise is an instructional program for teaching students how to decode multisyllabic words. Within this program, students are taught a strategy, called the Word Identification Strategy (Lenz, Schumaker, Deshler, & Beals, 1984), which they use each time they encounter an unknown word. Research has shown that when students are taught this strategy, the number of errors that they make in materials written at their grade level decrease dramatically. Twelve students with reading disabilities, who made between 13 and 37 decoding errors while orally reading a new passage before instruction in the strategy, made between 3 and 8 errors while reading a new passage after the instruction (Lenz & Hughes, 1990). They made these gains within six weeks of instruction (one hour per day). Although this program was designed initially for students with reading disabilities, it conceivably could be used effectively with a wide variety of students who exhibit decoding deficits. Thus, the purpose of this study was to test that possibility.

Subjects

Participants were a total of 124 students attending two high schools in a northeastern state. School A served as the experimental site, and School B served as the comparison site. The subjects were selected in each school by first administering all entering ninth-grade students the Word Identification Subtest of the Slosson Diagnostic Screening Test for Reading using Form A. All students in Schools A and B who earned a grade-equivalent score on the test that was below grade level (i.e., below the 9.0 grade level) were entered into the subject pool in each school. Then, students in the School B subject pool were matched with the students in the School A subject pool by grade level, age, sex, and race. If at all possible, they were also matched according to their grade-equivalent reading score within one grade level.

Subjects in School A included a total of 62 students. Thirty-two of them were males; 30 were females. Thirteen were African-American males, four were Hispanic males, and 15 were Caucasian males. Twelve were African-American females, five were Hispanic females, and 13 were Caucasian females. Students in School B matched the students in School A in numbers exactly. Among the students in School A, there were 11 youths who had been formally diagnosed as having learning disabilities.

The mean grade-equivalent reading score for the selected ninth-grade students in School A at the beginning of the study was 5.9 (range = 2.7 to 8.5). The mean grade-equivalent reading score for students in School B was 6.1 (range = 2.7 to 8.1).

Settings

The two schools were roughly equivalent in size and composition of the student population. School A had 1360 students; School B had 1421 students. The percentages of students receiving free and reduced-price lunches in Schools A and B were 53% and 47%,

respectively. The percentages of students who represent minority populations in Schools A and B were 59% and 53%, respectively.

Students in School A were taught in typical classrooms containing desks, chairs, an overhead projector, a chalkboard, and a screen.

Measurement

The Slossen Diagnostic Battery was administered to all students at the beginning and end of the study which spanned seven months. This test requires students to read sets of words aloud. The student is directed to read aloud each word separately and distinctly from left to right across the page. Testing continues until a student does not read all the words in a given row correctly. The reliability of the test forms for the ninth-grade level ranges from .90 to .94 (Gnagey & Gnagey, 1994).

The tester scored the student responses during each testing session which lasted approximately 5 to 10 minutes with each student. In order to assess interscorer reliability, 10% of the students' responses were tape recorded. A second scorer scored the student responses independently. The two scorers' records were compared item-by-item. An agreement was tallied when both scorers recorded the same symbol for an item to indicate whether the student pronounced the word correctly or not. The percentage of agreement was calculated by dividing the number of agreements by the total number of items and multiplying by 100. The percentage of agreement between the two scorers was 94%

Procedures

Word Identification Strategy instruction. The participating students in School A were taught the Word Identification Strategy, a strategy for decoding words (Lenz, Schumaker, Alley, & Beals, 1984). The instruction for this strategy had been previously validated in another study (Lenz & Hughes, 1990). Students follow six steps in sequence when they encounter an unknown word. First, they read the sentence in which the word is located to determine the context for the word (Discover the context) and whether or not they can guess the pronunciation of the word, once they understand its context. If they cannot guess the pronunciation, they begin taking the word apart. First, they pronounce the prefix (Isolate the prefix). Next, they pronounce the suffix (Separate the suffix). Following that, they try to say the remaining part of the word (Say the stem). If they cannot pronounce the stem, they take it apart using some basic rules (Examine the stem) and then try to pronounce it. If they are still not successful, they can either ask someone to pronounce the word for them (Check with someone) or refer to the pronunciation key in a dictionary for help (Try the dictionary).

School A students were taught to use this strategy according to the instructions in an instructor's manual (Lenz et al., 1984). To summarize these instructions, a seven-stage instructional methodology was used. First, the student's test score was shared with the student,

rationales were given to the student as to why he/she might want to learn a strategy for decoding words. The student was asked for his/her commitment to learn the strategy, and the student wrote a goal to that effect. Second, the steps of the strategy were described to the student as well as when and why the student might want to use the strategy. Third, the strategy was modeled for the student; this demonstration included a model of everything the student should think and do while performing the steps of the strategy. Fourth, the students learned to name the steps of the strategy so that they could instruct themselves to use the steps. Fifth, the student practiced using the strategy to mastery in materials written at the student's reading ability level. Mastery was defined as reading 98% of the words in a five-paragraph passage correctly. Sixth, the student practiced using the strategy in progressively more difficult reading materials until the student had mastered using the strategy in materials written at his/her grade level (ninth grade). Finally, the student was instructed on how to use the strategy in a variety of materials and contexts in and out of school so that the student knew how to use the strategy in a generative way.

Logistics. Participating students in School A were taken from their regularly scheduled ninth-grade English classes in groups of four to six students for the Word Identification Strategy instruction. They received the instruction daily for the whole class hour from one of two teachers who had been trained to teach the strategy and who had taught the strategy for one year prior to the study. Both teachers were about 45 years old at the time of the study. One of the teachers has a Master's degree in the teaching of reading. The other teacher holds an elementary teaching certificate and had worked with college students deficient in reading and writing skills.

The students met mastery on use of the strategy in grade-level materials within four to eight weeks of instruction. Then they returned to attending their English class for the rest of the school year. While they participated in the strategy instruction, their English grades were based on their performance in the strategy class.

Once one group of students had met mastery, another group of students began the instruction. The teacher taught one group of students during each class hour of the school day. This continued through the whole school year until all of the participating students had learned the strategy to mastery.

School B procedures. Selected students in School B attended their normally scheduled English, reading, and other classes. No special instruction was provided to them in a reading strategy.

Results

Results for the male students are shown in Figure 1 and for the female students in Figure 2. Male students in School A made average gains in reading decoding ranging between 2.8 and 3.8 grade levels; female students made average gains ranging between 2.8 and 3.4 grade levels in

decoding. In both cases of males and females in School A, the African-American students made the largest mean gains, and the Hispanic students made the lowest mean gains.

The matched students in School B, on the other hand, made minimal gains. The largest mean gain for both males and females was .4 of a grade level; in both cases, this gain was experienced by the Caucasian students. Both male and female Hispanic students lost ground across the school year, with the scores of the males decreasing by .7 of a grade level, and the scores of females decreasing by .1 of a grade level.

The results for students with LD in School A and their matched partners in School B are shown in Figure 3. The mean gain for the students with LD in School A was 3.9 grade levels (the mean pretest grade-level score was 4.9, and the mean posttest-grade level score was 8.8). The mean gain for their matched peers was .3 of a grade level (the mean pretest grade-level score was 5.9, and the mean posttest-grade level score was 6.3).

Results for individual students are shown in Tables 1, 2, and 3. These results show that every participating student in School A (62 students) earned a score on the posttest that represented a gain over the pretest score. Individual gains ranged from .6 to 6.1 grade levels. The overall mean gain by School A students in reading decoding was 3.4 grade levels (the mean pretest grade-level score was 5.9 and the mean posttest-grade level score was 9.3). In contrast, 38 students in School B made gains. Those gains ranged from .1 of a grade level to 1.7 grade levels. The overall mean gain by School B students in reading decoding was .2 of a grade level (the mean pretest grade-level score was 6.1 and the mean posttest-grade level score was 6.3).

The raw scores of students in School A and School B were compared using ANCOVAs. The pretest scores served as the covariate and the posttest scores served as the dependent variable in each comparison. The ANCOVA for the whole group revealed statistical differences between the students in Schools A and B, $F(1, 121) = 272.1$, $MSE = 31.078$, $p < .001$, $\eta^2 = .692$. The mean raw score for the students in School A on the pretest was 49.3 and on the posttest was 72.6 (the adjusted mean posttest score was 73.11). The mean raw score for the students in School B on the pretest was 51.2 and on the posttest was 57 (the adjusted mean posttest score was 56.5). The ANCOVA which compared the posttest scores of the students with LD in School A and their matched peers also revealed significant differences between the posttest scores, $F(1, 19) = 29.673$, $MSE = .43.94$, $p < .001$, $\eta^2 = .610$. The mean raw score for the students with LD in School A on the pretest was 41.1 and on the posttest was 69.2 (the adjusted mean posttest score was 73.654). The mean raw score for their matched peers on the pretest was 50.4 and on the posttest was 56.7 (the adjusted mean posttest score was 57.7).

Discussion

The results of this study show that a four- to six-week intensive intervention with ninth-grade students that involves instruction in the Word Identification Strategy is effective in

producing mean gains in reading decoding as large as 6 grade levels. In addition, students with and without learning disabilities can all benefit from the instruction.

The gains produced in this study were comparable to the gains produced in the original study which validated the instructional methods for teaching the Word Identification Strategy with 12 students with learning disabilities (Lenz & Hughes, 1990). At the end of that study, the students with LD were able to read grade-level passages that were about 400 words long with six or fewer errors. Thus, this study replicates the findings of the original study and extends them by focusing the instruction on a group of students who were not skilled at decoding but who were not diagnosed as having learning disabilities as well as students with LD. It also extends the findings by showing that students reading as low as the 2.7 grade level can benefit from the instruction. In the previous study, student participants were reading at or above the 3.5 grade level on the pretest. Additionally, it extends the findings of the original study by showing that students from different ethnic backgrounds can benefit from the instruction. Finally, it extends the findings of the previous study by showing that large numbers of students can be given the instruction, albeit in small groups, and the same kinds of results are achieved.

This study is limited by the fact that the students were not randomly selected into the groups. The use of a comparison school was necessary because personnel in School A were unwilling to instruct only half of the students who needed the instruction. The matching of subjects within two comparable schools was chosen as the best method to compensate for the inability to randomly select students within the same school.

Future research is needed to determine the long-term effects of this intervention. In addition, many of the students still had deficits in reading comprehension at the end of this study, so future research is needed to determine how to ameliorate those deficits for such a large population of students. Possible options include a special semester-long or year-long course on reading comprehension for selected students. The effects of the current intervention combined with a reading comprehension intervention need to be determined with regard to whether students pass their state competency test for reading. Only when comprehensive interventions like these are in place will students have a chance to succeed in required courses within the general education curriculum and pass high-stakes graduation tests.

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Table 1
Grade level scores on standardized decoding test for male students

	Demographic Information		Control Group		Experimental Group	
Student #	Gender	Ethnicity[1]	Pre	Post	Pre	Post
1	M	2	2.7	2.6	2.8	7.7
2	M	2	3.9	4.6	3.3	7.9
3	M	2	4.8	5.8	4.3	8.1
4	M	2	4.9	6.3	4.5	7.9
5	M	2	5.4	5.7	5.3	8.7
6	M	2	5.6	6.3	5.4	8.5
7	M	2	5.9	6.3	5.7	10.1
8	M	2	6.1	7.1	5.7	8.3
9	M	2	6.7	6.7	5.8*	8.7
10	M	2	7.1	6.5	6.1	11.1
11	M	2	7.1	7.1	6.5	10.1
12	M	2	7.3	7.4	6.8	10.8
13	M	2	8.1	7.7	7.3	10.1
14	M	4	5.5	3.8	4.1*	8.1
15	M	4	5.8	5.8	5.7	7.4
16	M	4	7.1	6.5	6.1	9.1
17	M	4	7.6	6.9	6.7	9.5
18	M	5	5.1	5.7	2.7*	8.1
19	M	5	5.3	6.1	3.9	8.3
20	M	5	5.6	5.9	4.4*	9.1
21	M	5	5.9	7.1	5.1	9.8
22	M	5	6.1	6.9	5.1	8.6
23	M	5	6.1	6.7	5.1*	8.5
24	M	5	6.3	6.6	5.3	9.5
25	M	5	6.5	7.7	5.4*	7.4
26	M	5	6.5	5.7	5.6	10.1
27	M	5	6.6	5.7	5.9	10.1
28	M	5	6.8	8.5	5.9*	10.1
29	M	5	7.1	7.4	6.5	9.1
30	M	5	7.3	6.9	6.5	8.7
31	M	5	7.3	6.7	6.8	8.5
32	M	5	8.1	8.1	7.3	10.5
Mean			6.2	6.4	5.4	9

[1]Ethnicity codes are: 2=African American, 4=Hispanic, and 5=Caucasian
*Indicates a student with a learning disability

Table 2

Grade level scores for standardized decoding test for female students

	Demographic Information		Control Group		Experimental Group	
Student #	Gender	Ethnicity[1]	Pre	Post	Pre	Post
1	F	2	2.8	2.9	2.7*	6.5
2	F	2	3.6	3.5	3.6	10.1
3	F	2	3.9	4.9	4.3	11.1
4	F	2	5.1	4.6	5.4	8.9
5	F	2	5.3	5.8	5.5	8.5
6	F	2	5.7	6.1	5.7	8.7
7	F	2	6.3	5.6	6.3	8.7
8	F	2	6.7	6.4	7.1	9.5
9	F	2	7.1	8.1	7.5	9.5
10	F	2	7.3	6.5	7.3	10.5
11	F	2	7.3	8.3	7.6	10.1
12	F	2	7.8	6.7	7.6	9.1
13	F	4	4.9	5.7	4.9*	5.7
14	F	4	5.5	5.5	5.9	9.8
15	F	4	5.8	4.9	7.1	10.5
16	F	4	7.1	5.3	7.6	11.9
17	F	4	7.3	8.7	8.1	9.5
18	F	5	5.1	5.8	4.7	9.8
19	F	5	5.7	5.7	5.1*	10.8
20	F	5	5.7	6.1	5.4	9.8
21	F	5	5.8	6.5	5.7	8.1
22	F	5	5.8	6.8	5.7	8.9
23	F	5	6.1	7.1	5.8*	11.9
24	F	5	6.5	6.8	6.1	7.4
25	F	5	6.6	6.7	7.3	11.5
26	F	5	6.7	6.8	7.4	10.1
27	F	5	6.8	6.9	7.6	9.1
28	F	5	7.3	7.4	8.1	11.1
29	F	5	7.3	7.4	8.3	9.5
30	F	5	7.8	7.9	8.5	9.8
Mean			6.1	6.2	6.3	9.5

[1]Ethnicity codes are: 2=African American, 4=Hispanic, and 5=Caucasian

*Indicates a student with a learning disability

Table 3

Grade level scores on standardized decoding test for students with learning disabilities in the experimental group and their matched peers in the control group

Experimental Group					Control Group				
Student #	Ethnicity[1]	Gender	Pre	Post	Student #	Ethnicity[1]	Gender	Pre	Post
1	2	M	5.8	8.7	12	2	M	6.7	6.7
2	2	M	6.8	10.8	13	2	M	7.3	7.4
3	4	M	4.1	8.1	14	4	M	5.5	3.8
4	5	M	2.7	8.1	15	5	M	5.1	5.7
5	5	M	4.4	9.1	16	5	M	5.6	5.9
6	5	M	5.4	7.4	17	5	M	6.5	7.7
7	5	M	5.9	10.1	18	5	M	6.8	8.5
8	2	F	2.7	6.5	19	2	F	5.1	4.6
9	4	F	4.9	5.7	20	4	F	4.9	5.7
10	5	F	5.1	10.8	21	5	F	5.7	5.7
11	5	F	5.8	11.9	22	5	F	6.1	7.1
Mean			4.9	8.8				5.9	6.3

[1]Ethnicity codes: 2=African American, 4=Hispanic, and 5=Caucasian

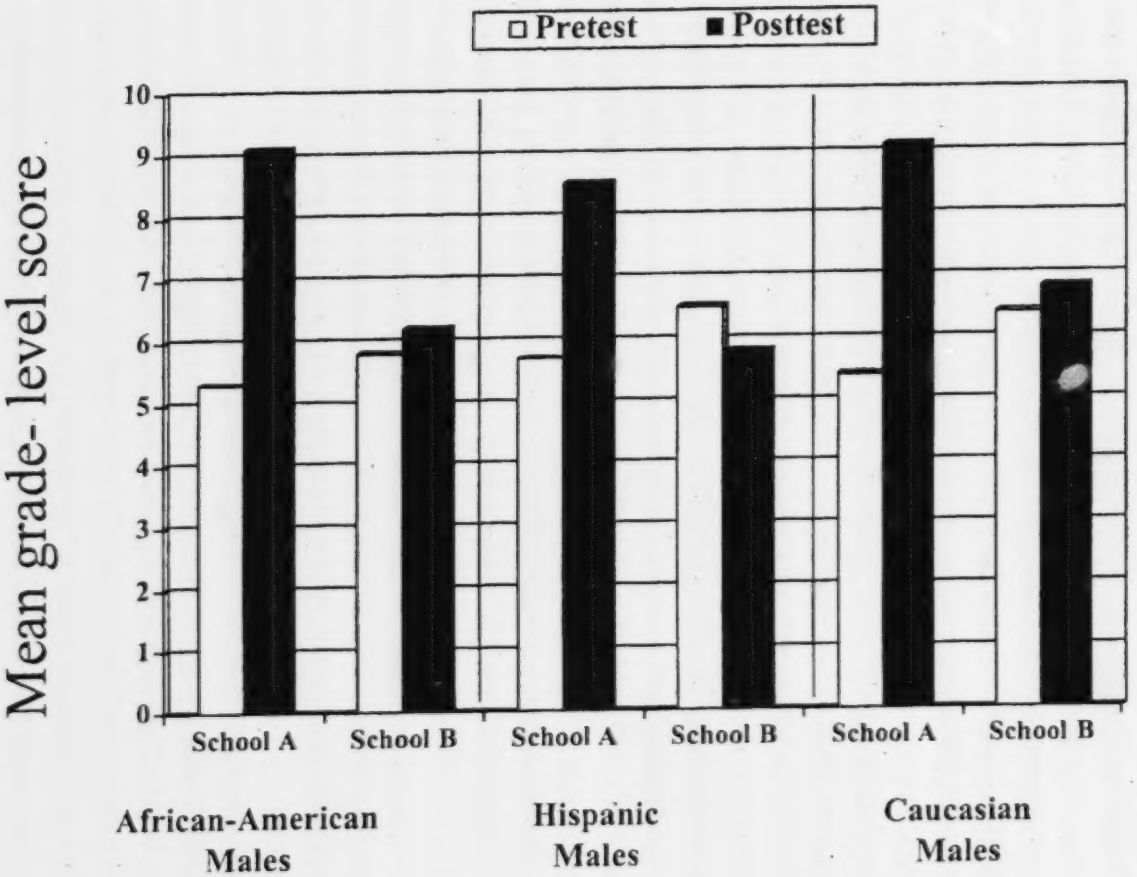

Figure 1. Mean decoding scores for high-school male students.

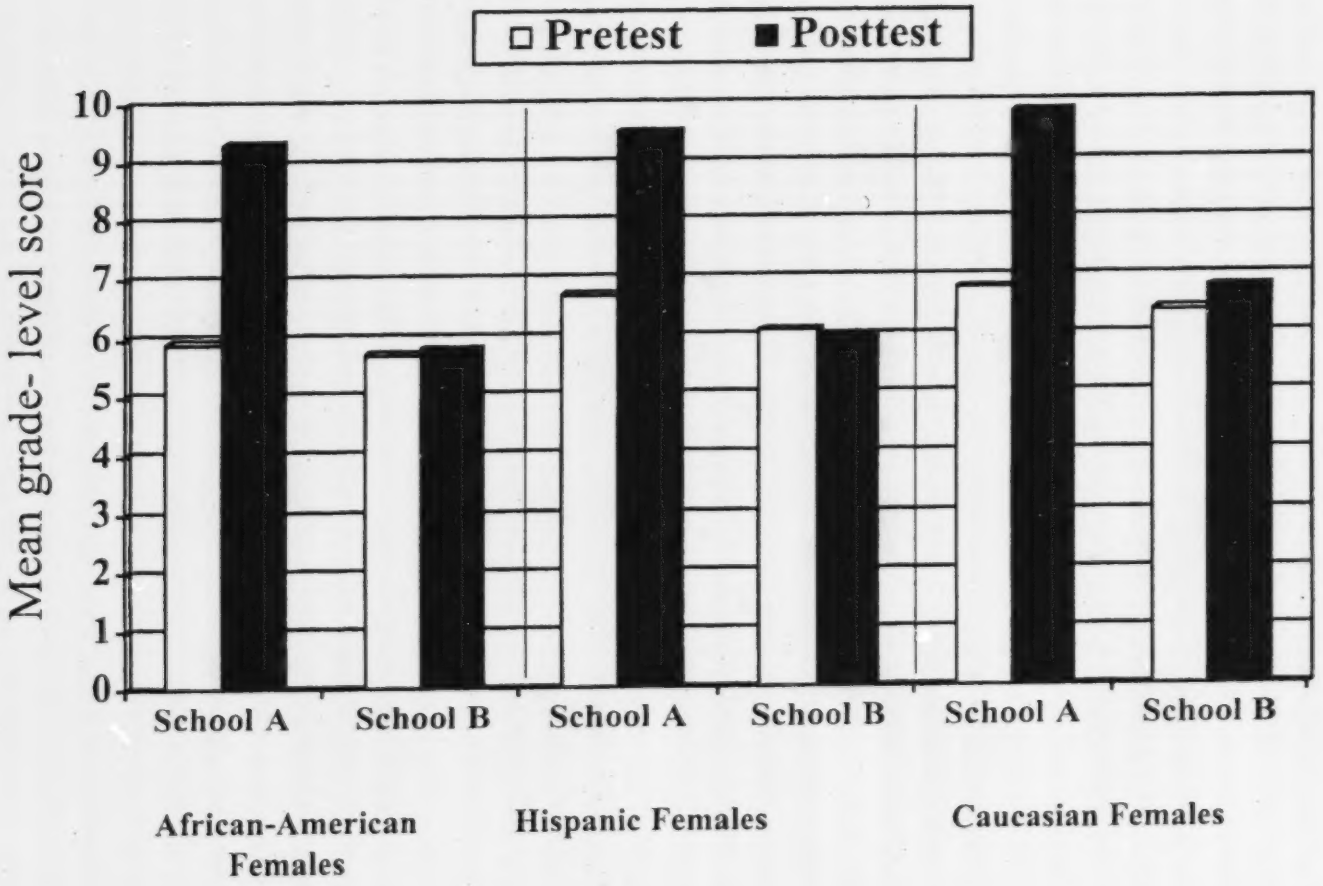

Figure 2. Mean decoding scores for high-school female students.

Figure 3. Mean decoding scores for high-school students with learning disabilities.

Abstract

Results of previous research have indicated that high-school personnel tend to be more concerned about at-risk students than about students with disabilities. Nevertheless, both groups are entering high school with severe reading deficits. Many of them are reading around the fourth- and fifth-grade levels, while high school textbooks are written at the ninth-grade level and above. Observational data collected in special education classrooms indicate that special education teachers are not teaching students with disabilities the reading skills that they need in order to meet the reading demands of rigorous general education classes. Service delivery models are needed for quickly teaching students with disabilities and other at-risk readers the reading skills that they need. Thus, this study involved the identification of all students entering ninth grade in two high schools who were reading one or more grade levels below the ninth-grade level. Next, identified students in the experimental school (N = 62) were removed from their English classes for periods of time ranging between four to eight weeks, depending on the time required by each student to reach the mastery level. They received instruction in the Word Identification Strategy, a learning strategy for decoding multisyllabic words, in small groups of four to six students. Students in the comparison school received traditional reading instruction in their English classes. Results of the posttests revealed that students with LD in the experimental school (N = 11) had gained an average of 3.9 grade levels in reading decoding skills. Matched students in the comparison school had made an average gain of .4 of a grade level. The whole group of experimental students (N = 62) had made an average gain of 3.4 grade levels in reading decoding skills. Matched students in the comparison school made an average gain of .2 of a grade level. These results indicate that intense strategy instruction within a relatively short period of time can boost students' decoding skills by several grade levels.

In recent efforts at school reform, two major changes have been made. First, the complexity of what is taught has increased dramatically. This is nowhere more apparent than at the secondary level. Over the past decade, textbooks have become thicker, and the content in them has become more and more complex. In some cases, the content is similar in complexity to the content that is delivered at the college level. The readability level of these textbooks has increased with the complexity of the content as more and more difficult-to-read words are included in them. Along with the increase in the amount of content to be taught as represented by these changes in course textbooks, teachers of subject-matter courses feel like they are under pressure to teach more content than they have ever taught.

The second change, which is closely tied to the first, has been an increased emphasis on accountability within education. As a result, all of the states have adopted curriculum standards, and 48 states have created assessment tools to measure students' performance in relation to the standards that have been adopted (Council of Chief State School Officers,, 1998). In 46 of these states, student reading performance is assessed (Council of Chief State School Officers, 1999). In addition, 18 of these states have approved a policy stating that students must meet certain standards before they can be promoted to a certain grade and/or allowed to graduate from high school (Olson, 2000). Naturally, these changes in today's educational climate have implications for students who are at-risk for failure in required subject-matter courses and on state assessment exams. Indeed, research studies are showing that many students enrolled in general education subject-matter courses are failing those courses (e.g., Bulgren, Schumaker, Deshler, 1988) and that they are reading several years below grade level. For example, tenth-grade students with learning disabilities are reading, on average, at the fourth-grade level, completing math tasks at the sixth grade level, and writing at the fourth-grade level (e.g., Warner, Schumaker, Alley, & Deshler, 1980). Not surprisingly, a large proportion (38% on average and as high as 85% in some states) of students with disabilities are dropping out of school (Wagner, Blackorby, & Hebbeler, 1993). In California in 2001, 91% of students with disabilities (including students with learning disabilities) failed the math section and 82% of students with disabilities failed the language arts section of a high school exit exam (Egelko, 2002).

Since these data show that large numbers of students are not performing well in high school courses and on competency exams, instructional programs are needed that will help these students remediate their skill deficits. A useful program would, of necessity, be short in duration while being powerful enough to ameliorate deficits because high school students need to realize immediate gains if they are to succeed in required courses. Unfortunately, no such programs are widely used or available.

One instructional program that shows promise is an instructional program for teaching students how to decode multisyllabic words. Within this program, students are taught a strategy, called the Word Identification Strategy (Lenz, Schumaker, Deshler, & Beals, 1984), which they use each time they encounter an unknown word. Research has shown that when students are taught this strategy, the number of errors that they make in materials written at their grade level decrease dramatically. Twelve students with reading disabilities, who made between 13 and 37 decoding errors while orally reading a new passage before instruction in the strategy, made between 3 and 8 errors while reading a new passage after the instruction (Lenz & Hughes, 1990). They made these gains within six weeks of instruction (one hour per day). Although this program was designed initially for students with reading disabilities, it conceivably could be used effectively with a wide variety of students who exhibit decoding deficits. Thus, the purpose of this study was to test that possibility.

Subjects

Participants were a total of 124 students attending two high schools in a northeastern state. School A served as the experimental site, and School B served as the comparison site. The subjects were selected in each school by first administering all entering ninth-grade students the Word Identification Subtest of the Slosson Diagnostic Screening Test for Reading using Form A. All students in Schools A and B who earned a grade-equivalent score on the test that was below grade level (i.e., below the 9.0 grade level) were entered into the subject pool in each school. Then, students in the School B subject pool were matched with the students in the School A subject pool by grade level, age, sex, and race. If at all possible, they were also matched according to their grade-equivalent reading score within one grade level.

Subjects in School A included a total of 62 students. Thirty-two of them were males; 30 were females. Thirteen were African-American males, four were Hispanic males, and 15 were Caucasian males. Twelve were African-American females, five were Hispanic females, and 13 were Caucasian females. Students in School B matched the students in School A in numbers exactly. Among the students in School A, there were 11 youths who had been formally diagnosed as having learning disabilities.

The mean grade-equivalent reading score for the selected ninth-grade students in School A at the beginning of the study was 5.9 (range = 2.7 to 8.5). The mean grade-equivalent reading score for students in School B was 6.1 (range = 2.7 to 8.1).

Settings

The two schools were roughly equivalent in size and composition of the student population. School A had 1360 students; School B had 1421 students. The percentages of students receiving free and reduced-price lunches in Schools A and B were 53% and 47%,

respectively. The percentages of students who represent minority populations in Schools A and B were 59% and 53%, respectively.

Students in School A were taught in typical classrooms containing desks, chairs, an overhead projector, a chalkboard, and a screen.

Measurement

The Slossen Diagnostic Battery was administered to all students at the beginning and end of the study which spanned seven months. This test requires students to read sets of words aloud. The student is directed to read aloud each word separately and distinctly from left to right across the page. Testing continues until a student does not read all the words in a given row correctly. The reliability of the test forms for the ninth-grade level ranges from .90 to .94 (Gnagey & Gnagey, 1994).

The tester scored the student responses during each testing session which lasted approximately 5 to 10 minutes with each student. In order to assess interscorer reliability, 10% of the students' responses were tape recorded. A second scorer scored the student responses independently. The two scorers' records were compared item-by-item. An agreement was tallied when both scorers recorded the same symbol for an item to indicate whether the student pronounced the word correctly or not. The percentage of agreement was calculated by dividing the number of agreements by the total number of items and multiplying by 100. The percentage of agreement between the two scorers was 94%

Procedures

Word Identification Strategy instruction. The participating students in School A were taught the Word Identification Strategy, a strategy for decoding words (Lenz, Schumaker, Alley, & Beals, 1984). The instruction for this strategy had been previously validated in another study (Lenz & Hughes, 1990). Students follow six steps in sequence when they encounter an unknown word. First, they read the sentence in which the word is located to determine the context for the word (Discover the context) and whether or not they can guess the pronunciation of the word, once they understand its context. If they cannot guess the pronunciation, they begin taking the word apart. First, they pronounce the prefix (Isolate the prefix). Next, they pronounce the suffix (Separate the suffix). Following that, they try to say the remaining part of the word (Say the stem). If they cannot pronounce the stem, they take it apart using some basic rules (Examine the stem) and then try to pronounce it. If they are still not successful, they can either ask someone to pronounce the word for them (Check with someone) or refer to the pronunciation key in a dictionary for help (Try the dictionary).

School A students were taught to use this strategy according to the instructions in an instructor's manual (Lenz et al., 1984). To summarize these instructions, a seven-stage instructional methodology was used. First, the student's test score was shared with the student,

rationales were given to the student as to why he/she might want to learn a strategy for decoding words. The student was asked for his/her commitment to learn the strategy, and the student wrote a goal to that effect. Second, the steps of the strategy were described to the student as well as when and why the student might want to use the strategy. Third, the strategy was modeled for the student; this demonstration included a model of everything the student should think and do while performing the steps of the strategy. Fourth, the students learned to name the steps of the strategy so that they could instruct themselves to use the steps. Fifth, the student practiced using the strategy to mastery in materials written at the student's reading ability level. Mastery was defined as reading 98% of the words in a five-paragraph passage correctly. Sixth, the student practiced using the strategy in progressively more difficult reading materials until the student had mastered using the strategy in materials written at his/her grade level (ninth grade). Finally, the student was instructed on how to use the strategy in a variety of materials and contexts in and out of school so that the student knew how to use the strategy in a generative way.

Logistics. Participating students in School A were taken from their regularly scheduled ninth-grade English classes in groups of four to six students for the Word Identification Strategy instruction. They received the instruction daily for the whole class hour from one of two teachers who had been trained to teach the strategy and who had taught the strategy for one year prior to the study. Both teachers were about 45 years old at the time of the study. One of the teachers has a Master's degree in the teaching of reading. The other teacher holds an elementary teaching certificate and had worked with college students deficient in reading and writing skills.

The students met mastery on use of the strategy in grade-level materials within four to eight weeks of instruction. Then they returned to attending their English class for the rest of the school year. While they participated in the strategy instruction, their English grades were based on their performance in the strategy class.

Once one group of students had met mastery, another group of students began the instruction. The teacher taught one group of students during each class hour of the school day. This continued through the whole school year until all of the participating students had learned the strategy to mastery.

School B procedures. Selected students in School B attended their normally scheduled English, reading, and other classes. No special instruction was provided to them in a reading strategy.

Results

Results for the male students are shown in Figure 1 and for the female students in Figure 2. Male students in School A made average gains in reading decoding ranging between 2.8 and 3.8 grade levels; female students made average gains ranging between 2.8 and 3.4 grade levels in

decoding. In both cases of males and females in School A, the African-American students made the largest mean gains, and the Hispanic students made the lowest mean gains.

The matched students in School B, on the other hand, made minimal gains. The largest mean gain for both males and females was .4 of a grade level; in both cases, this gain was experienced by the Caucasian students. Both male and female Hispanic students lost ground across the school year, with the scores of the males decreasing by .7 of a grade level, and the scores of females decreasing by .1 of a grade level.

The results for students with LD in School A and their matched partners in School B are shown in Figure 3. The mean gain for the students with LD in School A was 3.9 grade levels (the mean pretest grade-level score was 4.9, and the mean posttest-grade level score was 8.8). The mean gain for their matched peers was .3 of a grade level (the mean pretest grade-level score was 5.9, and the mean posttest-grade level score was 6.3).

Results for individual students are shown in Tables 1, 2, and 3. These results show that every participating student in School A (62 students) earned a score on the posttest that represented a gain over the pretest score. Individual gains ranged from .6 to 6.1 grade levels. The overall mean gain by School A students in reading decoding was 3.4 grade levels (the mean pretest grade-level score was 5.9 and the mean posttest-grade level score was 9.3). In contrast, 38 students in School B made gains. Those gains ranged from .1 of a grade level to 1.7 grade levels. The overall mean gain by School B students in reading decoding was .2 of a grade level (the mean pretest grade-level score was 6.1 and the mean posttest-grade level score was 6.3).

The raw scores of students in School A and School B were compared using ANCOVAs. The pretest scores served as the covariate and the posttest scores served as the dependent variable in each comparison. The ANCOVA for the whole group revealed statistical differences between the students in Schools A and B, $F(1, 121) = 272.1$, MSE = 31.078, $p < .001$, $\eta^2 = .692$. The mean raw score for the students in School A on the pretest was 49.3 and on the posttest was 72.6 (the adjusted mean posttest score was 73.11). The mean raw score for the students in School B on the pretest was 51.2 and on the posttest was 57 (the adjusted mean posttest score was 56.5). The ANCOVA which compared the posttest scores of the students with LD in School A and their matched peers also revealed significant differences between the posttest scores, $F(1, 19) = 29.673$, MSE = .43.94, $p < .001$, $\eta^2 = .610$. The mean raw score for the students with LD in School A on the pretest was 41.1 and on the posttest was 69.2 (the adjusted mean posttest score was 73.654). The mean raw score for their matched peers on the pretest was 50.4 and on the posttest was 56.7 (the adjusted mean posttest score was 57.7).

Discussion

The results of this study show that a four- to six-week intensive intervention with ninth-grade students that involves instruction in the Word Identification Strategy is effective in

producing mean gains in reading decoding as large as 6 grade levels. In addition, students with and without learning disabilities can all benefit from the instruction.

The gains produced in this study were comparable to the gains produced in the original study which validated the instructional methods for teaching the Word Identification Strategy with 12 students with learning disabilities (Lenz & Hughes, 1990). At the end of that study, the students with LD were able to read grade-level passages that were about 400 words long with six or fewer errors. Thus, this study replicates the findings of the original study and extends them by focusing the instruction on a group of students who were not skilled at decoding but who were not diagnosed as having learning disabilities as well as students with LD. It also extends the findings by showing that students reading as low as the 2.7 grade level can benefit from the instruction. In the previous study, student participants were reading at or above the 3.5 grade level on the pretest. Additionally, it extends the findings of the original study by showing that students from different ethnic backgrounds can benefit from the instruction. Finally, it extends the findings of the previous study by showing that large numbers of students can be given the instruction, albeit in small groups, and the same kinds of results are achieved.

This study is limited by the fact that the students were not randomly selected into the groups. The use of a comparison school was necessary because personnel in School A were unwilling to instruct only half of the students who needed the instruction. The matching of subjects within two comparable schools was chosen as the best method to compensate for the inability to randomly select students within the same school.

Future research is needed to determine the long-term effects of this intervention. In addition, many of the students still had deficits in reading comprehension at the end of this study, so future research is needed to determine how to ameliorate those deficits for such a large population of students. Possible options include a special semester-long or year-long course on reading comprehension for selected students. The effects of the current intervention combined with a reading comprehension intervention need to be determined with regard to whether students pass their state competency test for reading. Only when comprehensive interventions like these are in place will students have a chance to succeed in required courses within the general education curriculum and pass high-stakes graduation tests.

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Table 1
Grade level scores on standardized decoding test for male students

	Demographic Information		Control Group		Experimental Group	
Student #	Gender	Ethnicity[1]	Pre	Post	Pre	Post
1	M	2	2.7	2.6	2.8	7.7
2	M	2	3.9	4.6	3.3	7.9
3	M	2	4.8	5.8	4.3	8.1
4	M	2	4.9	6.3	4.5	7.9
5	M	2	5.4	5.7	5.3	8.7
6	M	2	5.6	6.3	5.4	8.5
7	M	2	5.9	6.3	5.7	10.1
8	M	2	6.1	7.1	5.7	8.3
9	M	2	6.7	6.7	5.8*	8.7
10	M	2	7.1	6.5	6.1	11.1
11	M	2	7.1	7.1	6.5	10.1
12	M	2	7.3	7.4	6.8	10.8
13	M	2	8.1	7.7	7.3	10.1
14	M	4	5.5	3.8	4.1*	8.1
15	M	4	5.8	5.8	5.7	7.4
16	M	4	7.1	6.5	6.1	9.1
17	M	4	7.6	6.9	6.7	9.5
18	M	5	5.1	5.7	2.7*	8.1
19	M	5	5.3	6.1	3.9	8.3
20	M	5	5.6	5.9	4.4*	9.1
21	M	5	5.9	7.1	5.1	9.8
22	M	5	6.1	6.9	5.1	8.6
23	M	5	6.1	6.7	5.1*	8.5
24	M	5	6.3	6.6	5.3	9.5
25	M	5	6.5	7.7	5.4*	7.4
26	M	5	6.5	5.7	5.6	10.1
27	M	5	6.6	5.7	5.9	10.1
28	M	5	6.8	8.5	5.9*	10.1
29	M	5	7.1	7.4	6.5	9.1
30	M	5	7.3	6.9	6.5	8.7
31	M	5	7.3	6.7	6.8	8.5
32	M	5	8.1	8.1	7.3	10.5
Mean			6.2	6.4	5.4	9

[1]Ethnicity codes are: 2=African American, 4=Hispanic, and 5=Caucasian
*Indicates a student with a learning disability

Table 2

Grade level scores for standardized decoding test for female students

	Demographic Information		Control Group		Experimental Group	
Student #	Gender	Ethnicity[1]	Pre	Post	Pre	Post
1	F	2	2.8	2.9	2.7*	6.5
2	F	2	3.6	3.5	3.6	10.1
3	F	2	3.9	4.9	4.3	11.1
4	F	2	5.1	4.6	5.4	8.9
5	F	2	5.3	5.8	5.5	8.5
6	F	2	5.7	6.1	5.7	8.7
7	F	2	6.3	5.6	6.3	8.7
8	F	2	6.7	6.4	7.1	9.5
9	F	2	7.1	8.1	7.5	9.5
10	F	2	7.3	6.5	7.3	10.5
11	F	2	7.3	8.3	7.6	10.1
12	F	2	7.8	6.7	7.6	9.1
13	F	4	4.9	5.7	4.9*	5.7
14	F	4	5.5	5.5	5.9	9.8
15	F	4	5.8	4.9	7.1	10.5
16	F	4	7.1	5.3	7.6	11.9
17	F	4	7.3	8.7	8.1	9.5
18	F	5	5.1	5.8	4.7	9.8
19	F	5	5.7	5.7	5.1*	10.8
20	F	5	5.7	6.1	5.4	9.8
21	F	5	5.8	6.5	5.7	8.1
22	F	5	5.8	6.8	5.7	8.9
23	F	5	6.1	7.1	5.8*	11.9
24	F	5	6.5	6.8	6.1	7.4
25	F	5	6.6	6.7	7.3	11.5
26	F	5	6.7	6.8	7.4	10.1
27	F	5	6.8	6.9	7.6	9.1
28	F	5	7.3	7.4	8.1	11.1
29	F	5	7.3	7.4	8.3	9.5
30	F	5	7.8	7.9	8.5	9.8
Mean			6.1	6.2	6.3	9.5

[1]Ethnicity codes are: 2=African American, 4=Hispanic, and 5=Caucasian

*Indicates a student with a learning disability

Table 3

Grade level scores on standardized decoding test for students with learning disabilities in the experimental group and their matched peers in the control group

Experimental Group					Control Group				
Student #	Ethnicity[1]	Gender	Pre	Post	Student #	Ethnicity[1]	Gender	Pre	Post
1	2	M	5.8	8.7	12	2	M	6.7	6.7
2	2	M	6.8	10.8	13	2	M	7.3	7.4
3	4	M	4.1	8.1	14	4	M	5.5	3.8
4	5	M	2.7	8.1	15	5	M	5.1	5.7
5	5	M	4.4	9.1	16	5	M	5.6	5.9
6	5	M	5.4	7.4	17	5	M	6.5	7.7
7	5	M	5.9	10.1	18	5	M	6.8	8.5
8	2	F	2.7	6.5	19	2	F	5.1	4.6
9	4	F	4.9	5.7	20	4	F	4.9	5.7
10	5	F	5.1	10.8	21	5	F	5.7	5.7
11	5	F	5.8	11.9	22	5	F	6.1	7.1
Mean			4.9	8.8				5.9	6.3

[1]Ethnicity codes: 2=African American, 4=Hispanic, and 5=Caucasian

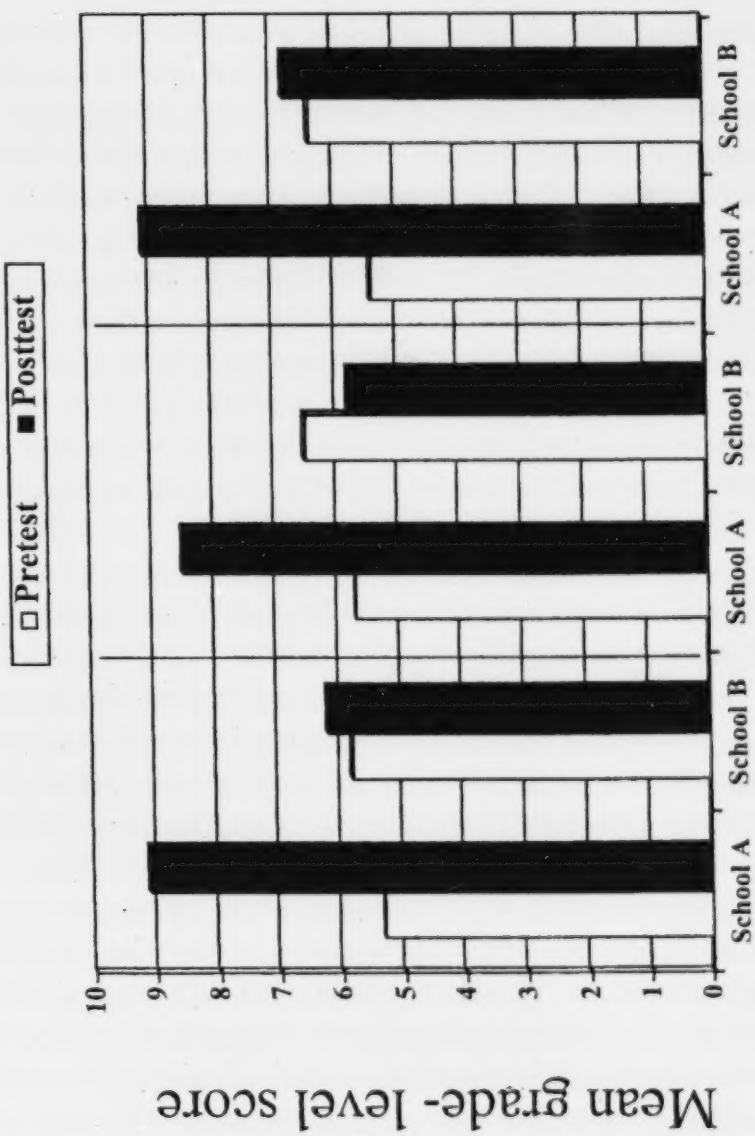

Figure 1. Mean decoding scores for high-school male students.

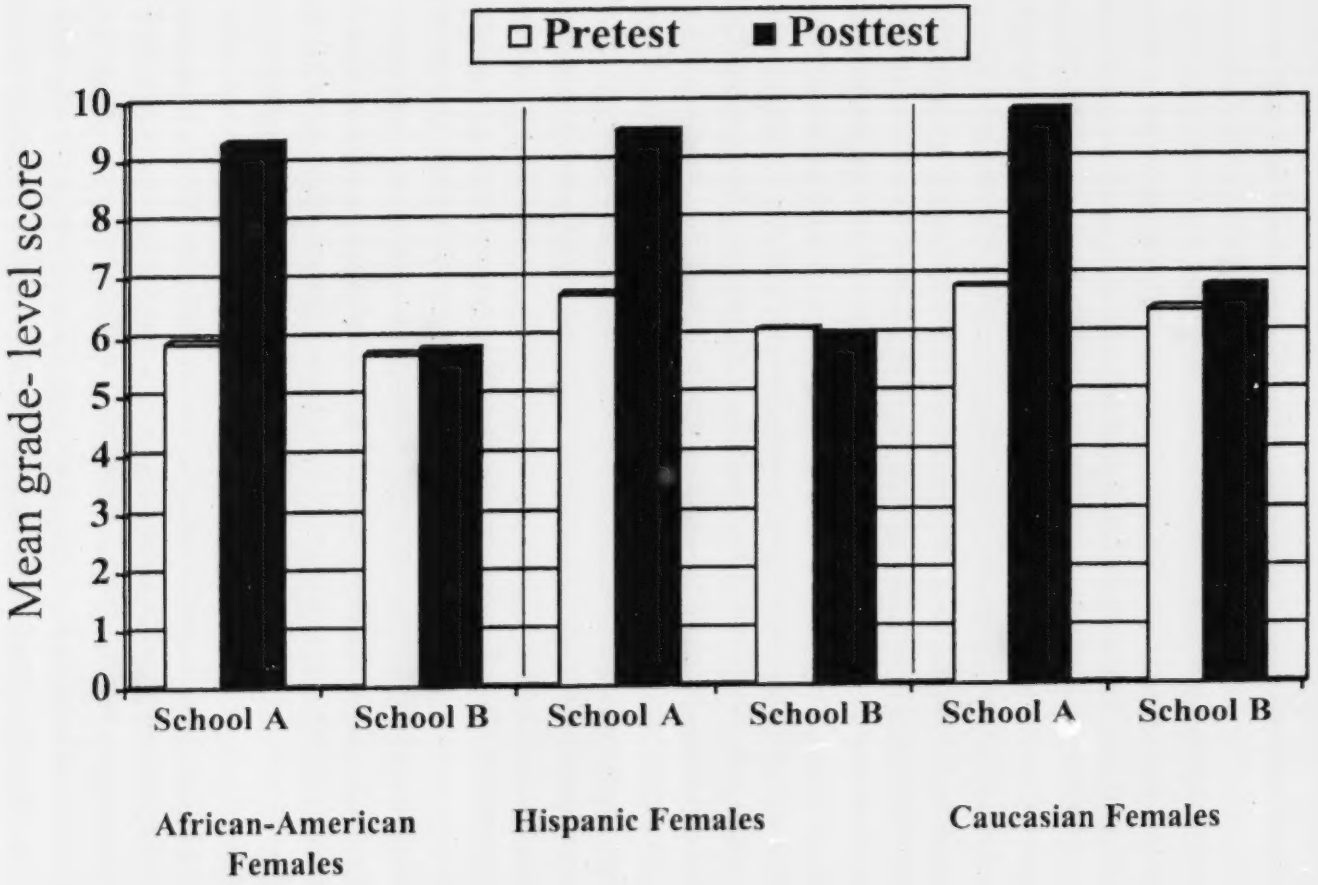

Figure 2. Mean decoding scores for high-school female students.

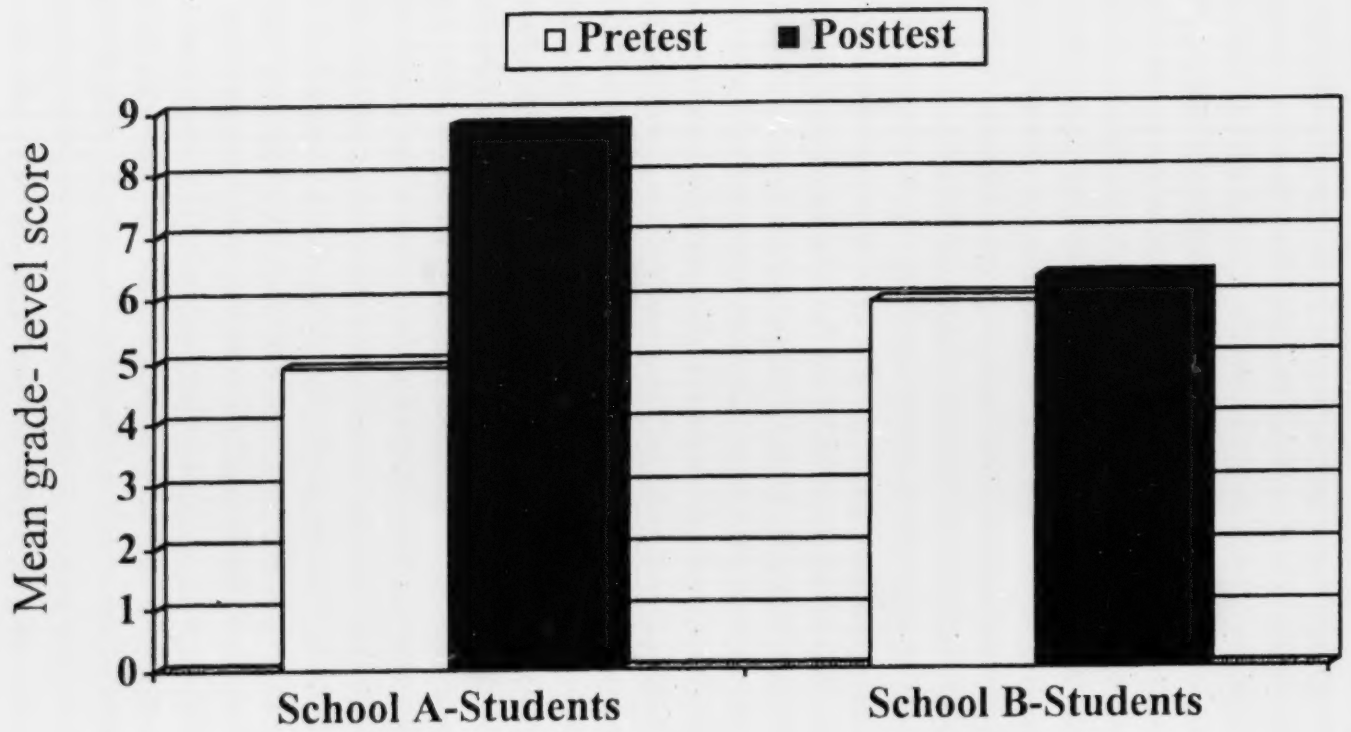

Figure 3. Mean decoding scores for high-school students with learning disabilities.

Abstract

Results of previous research have indicated that high-school personnel tend to be more concerned about at-risk students than about students with disabilities. Nevertheless, both groups are entering high school with severe reading deficits. Many of them are reading around the fourth- and fifth-grade levels, while high school textbooks are written at the ninth-grade level and above. Observational data collected in special education classrooms indicate that special education teachers are not teaching students with disabilities the reading skills that they need in order to meet the reading demands of rigorous general education classes. Service delivery models are needed for quickly teaching students with disabilities and other at-risk readers the reading skills that they need. Thus, this study involved the identification of all students entering ninth grade in two high schools who were reading one or more grade levels below the ninth-grade level. Next, identified students in the experimental school (N = 62) were removed from their English classes for periods of time ranging between four to eight weeks, depending on the time required by each student to reach the mastery level. They received instruction in the Word Identification Strategy, a learning strategy for decoding multisyllabic words, in small groups of four to six students. Students in the comparison school received traditional reading instruction in their English classes. Results of the posttests revealed that students with LD in the experimental school (N = 11) had gained an average of 3.9 grade levels in reading decoding skills. Matched students in the comparison school had made an average gain of .4 of a grade level. The whole group of experimental students (N = 62) had made an average gain of 3.4 grade levels in reading decoding skills. Matched students in the comparison school made an average gain of .2 of a grade level. These results indicate that intense strategy instruction within a relatively short period of time can boost students' decoding skills by several grade levels.

In recent efforts at school reform, two major changes have been made. First, the complexity of what is taught has increased dramatically. This is nowhere more apparent than at the secondary level. Over the past decade, textbooks have become thicker, and the content in them has become more and more complex. In some cases, the content is similar in complexity to the content that is delivered at the college level. The readability level of these textbooks has increased with the complexity of the content as more and more difficult-to-read words are included in them. Along with the increase in the amount of content to be taught as represented by these changes in course textbooks, teachers of subject-matter courses feel like they are under pressure to teach more content than they have ever taught.

The second change, which is closely tied to the first, has been an increased emphasis on accountability within education. As a result, all of the states have adopted curriculum standards, and 48 states have created assessment tools to measure students' performance in relation to the standards that have been adopted (Council of Chief State School Officers,, 1998). In 46 of these states, student reading performance is assessed (Council of Chief State School Officers, 1999). In addition, 18 of these states have approved a policy stating that students must meet certain standards before they can be promoted to a certain grade and/or allowed to graduate from high school (Olson, 2000). Naturally, these changes in today's educational climate have implications for students who are at-risk for failure in required subject-matter courses and on state assessment exams. Indeed, research studies are showing that many students enrolled in general education subject-matter courses are failing those courses (e.g., Bulgren, Schumaker, Deshler, 1988) and that they are reading several years below grade level. For example, tenth-grade students with learning disabilities are reading, on average, at the fourth-grade level, completing math tasks at the sixth grade level, and writing at the fourth-grade level (e.g., Warner, Schumaker, Alley, & Deshler, 1980). Not surprisingly, a large proportion (38% on average and as high as 85% in some states) of students with disabilities are dropping out of school (Wagner, Blackorby, & Hebbeler, 1993). In California in 2001, 91% of students with disabilities (including students with learning disabilities) failed the math section and 82% of students with disabilities failed the language arts section of a high school exit exam (Egelko, 2002).

Since these data show that large numbers of students are not performing well in high school courses and on competency exams, instructional programs are needed that will help these students remediate their skill deficits. A useful program would, of necessity, be short in duration while being powerful enough to ameliorate deficits because high school students need to realize immediate gains if they are to succeed in required courses. Unfortunately, no such programs are widely used or available.

One instructional program that shows promise is an instructional program for teaching students how to decode multisyllabic words. Within this program, students are taught a strategy, called the Word Identification Strategy (Lenz, Schumaker, Deshler, & Beals, 1984), which they use each time they encounter an unknown word. Research has shown that when students are taught this strategy, the number of errors that they make in materials written at their grade level decrease dramatically. Twelve students with reading disabilities, who made between 13 and 37 decoding errors while orally reading a new passage before instruction in the strategy, made between 3 and 8 errors while reading a new passage after the instruction (Lenz & Hughes, 1990). They made these gains within six weeks of instruction (one hour per day). Although this program was designed initially for students with reading disabilities, it conceivably could be used effectively with a wide variety of students who exhibit decoding deficits. Thus, the purpose of this study was to test that possibility.

Subjects

Participants were a total of 124 students attending two high schools in a northeastern state. School A served as the experimental site, and School B served as the comparison site. The subjects were selected in each school by first administering all entering ninth-grade students the Word Identification Subtest of the Slosson Diagnostic Screening Test for Reading using Form A. All students in Schools A and B who earned a grade-equivalent score on the test that was below grade level (i.e., below the 9.0 grade level) were entered into the subject pool in each school. Then, students in the School B subject pool were matched with the students in the School A subject pool by grade level, age, sex, and race. If at all possible, they were also matched according to their grade-equivalent reading score within one grade level.

Subjects in School A included a total of 62 students. Thirty-two of them were males; 30 were females. Thirteen were African-American males, four were Hispanic males, and 15 were Caucasian males. Twelve were African-American females, five were Hispanic females, and 13 were Caucasian females. Students in School B matched the students in School A in numbers exactly. Among the students in School A, there were 11 youths who had been formally diagnosed as having learning disabilities.

The mean grade-equivalent reading score for the selected ninth-grade students in School A at the beginning of the study was 5.9 (range = 2.7 to 8.5). The mean grade-equivalent reading score for students in School B was 6.1 (range = 2.7 to 8.1).

Settings

The two schools were roughly equivalent in size and composition of the student population. School A had 1360 students; School B had 1421 students. The percentages of students receiving free and reduced-price lunches in Schools A and B were 53% and 47%,

respectively. The percentages of students who represent minority populations in Schools A and B were 59% and 53%, respectively.

Students in School A were taught in typical classrooms containing desks, chairs, an overhead projector, a chalkboard, and a screen.

Measurement

The Slossen Diagnostic Battery was administered to all students at the beginning and end of the study which spanned seven months. This test requires students to read sets of words aloud. The student is directed to read aloud each word separately and distinctly from left to right across the page. Testing continues until a student does not read all the words in a given row correctly. The reliability of the test forms for the ninth-grade level ranges from .90 to .94 (Gnagey & Gnagey, 1994).

The tester scored the student responses during each testing session which lasted approximately 5 to 10 minutes with each student. In order to assess interscorer reliability, 10% of the students' responses were tape recorded. A second scorer scored the student responses independently. The two scorers' records were compared item-by-item. An agreement was tallied when both scorers recorded the same symbol for an item to indicate whether the student pronounced the word correctly or not. The percentage of agreement was calculated by dividing the number of agreements by the total number of items and multiplying by 100. The percentage of agreement between the two scorers was 94%

Procedures

Word Identification Strategy instruction. The participating students in School A were taught the Word Identification Strategy, a strategy for decoding words (Lenz, Schumaker, Alley, & Beals, 1984). The instruction for this strategy had been previously validated in another study (Lenz & Hughes, 1990). Students follow six steps in sequence when they encounter an unknown word. First, they read the sentence in which the word is located to determine the context for the word (Discover the context) and whether or not they can guess the pronunciation of the word, once they understand its context. If they cannot guess the pronunciation, they begin taking the word apart. First, they pronounce the prefix (Isolate the prefix). Next, they pronounce the suffix (Separate the suffix). Following that, they try to say the remaining part of the word (Say the stem). If they cannot pronounce the stem, they take it apart using some basic rules (Examine the stem) and then try to pronounce it. If they are still not successful, they can either ask someone to pronounce the word for them (Check with someone) or refer to the pronunciation key in a dictionary for help (Try the dictionary).

School A students were taught to use this strategy according to the instructions in an instructor's manual (Lenz et al., 1984). To summarize these instructions, a seven-stage instructional methodology was used. First, the student's test score was shared with the student,

rationales were given to the student as to why he/she might want to learn a strategy for decoding words. The student was asked for his/her commitment to learn the strategy, and the student wrote a goal to that effect. Second, the steps of the strategy were described to the student as well as when and why the student might want to use the strategy. Third, the strategy was modeled for the student; this demonstration included a model of everything the student should think and do while performing the steps of the strategy. Fourth, the students learned to name the steps of the strategy so that they could instruct themselves to use the steps. Fifth, the student practiced using the strategy to mastery in materials written at the student's reading ability level. Mastery was defined as reading 98% of the words in a five-paragraph passage correctly. Sixth, the student practiced using the strategy in progressively more difficult reading materials until the student had mastered using the strategy in materials written at his/her grade level (ninth grade). Finally, the student was instructed on how to use the strategy in a variety of materials and contexts in and out of school so that the student knew how to use the strategy in a generative way.

Logistics. Participating students in School A were taken from their regularly scheduled ninth-grade English classes in groups of four to six students for the Word Identification Strategy instruction. They received the instruction daily for the whole class hour from one of two teachers who had been trained to teach the strategy and who had taught the strategy for one year prior to the study. Both teachers were about 45 years old at the time of the study. One of the teachers has a Master's degree in the teaching of reading. The other teacher holds an elementary teaching certificate and had worked with college students deficient in reading and writing skills.

The students met mastery on use of the strategy in grade-level materials within four to eight weeks of instruction. Then they returned to attending their English class for the rest of the school year. While they participated in the strategy instruction, their English grades were based on their performance in the strategy class.

Once one group of students had met mastery, another group of students began the instruction. The teacher taught one group of students during each class hour of the school day. This continued through the whole school year until all of the participating students had learned the strategy to mastery.

School B procedures. Selected students in School B attended their normally scheduled English, reading, and other classes. No special instruction was provided to them in a reading strategy.

Results

Results for the male students are shown in Figure 1 and for the female students in Figure 2. Male students in School A made average gains in reading decoding ranging between 2.8 and 3.8 grade levels; female students made average gains ranging between 2.8 and 3.4 grade levels in

decoding. In both cases of males and females in School A, the African-American students made the largest mean gains, and the Hispanic students made the lowest mean gains.

The matched students in School B, on the other hand, made minimal gains. The largest mean gain for both males and females was .4 of a grade level; in both cases, this gain was experienced by the Caucasian students. Both male and female Hispanic students lost ground across the school year, with the scores of the males decreasing by .7 of a grade level, and the scores of females decreasing by .1 of a grade level.

The results for students with LD in School A and their matched partners in School B are shown in Figure 3. The mean gain for the students with LD in School A was 3.9 grade levels (the mean pretest grade-level score was 4.9, and the mean posttest-grade level score was 8.8). The mean gain for their matched peers was .3 of a grade level (the mean pretest grade-level score was 5.9, and the mean posttest-grade level score was 6.3).

Results for individual students are shown in Tables 1, 2, and 3. These results show that every participating student in School A (62 students) earned a score on the posttest that represented a gain over the pretest score. Individual gains ranged from .6 to 6.1 grade levels. The overall mean gain by School A students in reading decoding was 3.4 grade levels (the mean pretest grade-level score was 5.9 and the mean posttest-grade level score was 9.3). In contrast, 38 students in School B made gains. Those gains ranged from .1 of a grade level to 1.7 grade levels. The overall mean gain by School B students in reading decoding was .2 of a grade level (the mean pretest grade-level score was 6.1 and the mean posttest-grade level score was 6.3).

The raw scores of students in School A and School B were compared using ANCOVAs. The pretest scores served as the covariate and the posttest scores served as the dependent variable in each comparison. The ANCOVA for the whole group revealed statistical differences between the students in Schools A and B, $\underline{F}$ (1, 121) = 272.1, MSE = 31.078, $\underline{p}$. < .001, η 2 =.692. The mean raw score for the students in School A on the pretest was 49.3 and on the posttest was 72.6 (the adjusted mean posttest score was 73.11). The mean raw score for the students in School B on the pretest was 51.2 and on the posttest was 57 (the adjusted mean posttest score was 56.5). The ANCOVA which compared the posttest scores of the students with LD in School A and their matched peers also revealed significant differences between the posttest scores, $\underline{F}$ (1, 19) = 29.673, MSE = .43.94, $\underline{p}$. < .001, η 2 =.610. The mean raw score for the students with LD in School A on the pretest was 41.1 and on the posttest was 69.2 (the adjusted mean posttest score was 73.654). The mean raw score for their matched peers on the pretest was 50.4 and on the posttest was 56.7 (the adjusted mean posttest score was 57.7).

Discussion

The results of this study show that a four- to six-week intensive intervention with ninth-grade students that involves instruction in the Word Identification Strategy is effective in

producing mean gains in reading decoding as large as 6 grade levels. In addition, students with and without learning disabilities can all benefit from the instruction.

The gains produced in this study were comparable to the gains produced in the original study which validated the instructional methods for teaching the Word Identification Strategy with 12 students with learning disabilities (Lenz & Hughes, 1990). At the end of that study, the students with LD were able to read grade-level passages that were about 400 words long with six or fewer errors. Thus, this study replicates the findings of the original study and extends them by focusing the instruction on a group of students who were not skilled at decoding but who were not diagnosed as having learning disabilities as well as students with LD. It also extends the findings by showing that students reading as low as the 2.7 grade level can benefit from the instruction. In the previous study, student participants were reading at or above the 3.5 grade level on the pretest. Additionally, it extends the findings of the original study by showing that students from different ethnic backgrounds can benefit from the instruction. Finally, it extends the findings of the previous study by showing that large numbers of students can be given the instruction, albeit in small groups, and the same kinds of results are achieved.

This study is limited by the fact that the students were not randomly selected into the groups. The use of a comparison school was necessary because personnel in School A were unwilling to instruct only half of the students who needed the instruction. The matching of subjects within two comparable schools was chosen as the best method to compensate for the inability to randomly select students within the same school.

Future research is needed to determine the long-term effects of this intervention. In addition, many of the students still had deficits in reading comprehension at the end of this study, so future research is needed to determine how to ameliorate those deficits for such a large population of students. Possible options include a special semester-long or year-long course on reading comprehension for selected students. The effects of the current intervention combined with a reading comprehension intervention need to be determined with regard to whether students pass their state competency test for reading. Only when comprehensive interventions like these are in place will students have a chance to succeed in required courses within the general education curriculum and pass high-stakes graduation tests.

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Table 1
Grade level scores on standardized decoding test for male students

	Demographic Information		Control Group		Experimental Group	
Student #	Gender	Ethnicity[1]	Pre	Post	Pre	Post
1	M	2	2.7	2.6	2.8	7.7
2	M	2	3.9	4.6	3.3	7.9
3	M	2	4.8	5.8	4.3	8.1
4	M	2	4.9	6.3	4.5	7.9
5	M	2	5.4	5.7	5.3	8.7
6	M	2	5.6	6.3	5.4	8.5
7	M	2	5.9	6.3	5.7	10.1
8	M	2	6.1	7.1	5.7	8.3
9	M	2	6.7	6.7	5.8*	8.7
10	M	2	7.1	6.5	6.1	11.1
11	M	2	7.1	7.1	6.5	10.1
12	M	2	7.3	7.4	6.8	10.8
13	M	2	8.1	7.7	7.3	10.1
14	M	4	5.5	3.8	4.1*	8.1
15	M	4	5.8	5.8	5.7	7.4
16	M	4	7.1	6.5	6.1	9.1
17	M	4	7.6	6.9	6.7	9.5
18	M	5	5.1	5.7	2.7*	8.1
19	M	5	5.3	6.1	3.9	8.3
20	M	5	5.6	5.9	4.4*	9.1
21	M	5	5.9	7.1	5.1	9.8
22	M	5	6.1	6.9	5.1	8.6
23	M	5	6.1	6.7	5.1*	8.5
24	M	5	6.3	6.6	5.3	9.5
25	M	5	6.5	7.7	5.4*	7.4
26	M	5	6.5	5.7	5.6	10.1
27	M	5	6.6	5.7	5.9	10.1
28	M	5	6.8	8.5	5.9*	10.1
29	M	5	7.1	7.4	6.5	9.1
30	M	5	7.3	6.9	6.5	8.7
31	M	5	7.3	6.7	6.8	8.5
32	M	5	8.1	8.1	7.3	10.5
Mean			6.2	6.4	5.4	9

[1]Ethnicity codes are: 2=African American, 4=Hispanic, and 5=Caucasian
*Indicates a student with a learning disability

Table 2

Grade level scores for standardized decoding test for female students

	Demographic Information		Control Group		Experimental Group	
Student #	Gender	Ethnicity[1]	Pre	Post	Pre	Post
1	F	2	2.8	2.9	2.7*	6.5
2	F	2	3.6	3.5	3.6	10.1
3	F	2	3.9	4.9	4.3	11.1
4	F	2	5.1	4.6	5.4	8.9
5	F	2	5.3	5.8	5.5	8.5
6	F	2	5.7	6.1	5.7	8.7
7	F	2	6.3	5.6	6.3	8.7
8	F	2	6.7	6.4	7.1	9.5
9	F	2	7.1	8.1	7.5	9.5
10	F	2	7.3	6.5	7.3	10.5
11	F	2	7.3	8.3	7.6	10.1
12	F	2	7.8	6.7	7.6	9.1
13	F	4	4.9	5.7	4.9*	5.7
14	F	4	5.5	5.5	5.9	9.8
15	F	4	5.8	4.9	7.1	10.5
16	F	4	7.1	5.3	7.6	11.9
17	F	4	7.3	8.7	8.1	9.5
18	F	5	5.1	5.8	4.7	9.8
19	F	5	5.7	5.7	5.1*	10.8
20	F	5	5.7	6.1	5.4	9.8
21	F	5	5.8	6.5	5.7	8.1
22	F	5	5.8	6.8	5.7	8.9
23	F	5	6.1	7.1	5.8*	11.9
24	F	5	6.5	6.8	6.1	7.4
25	F	5	6.6	6.7	7.3	11.5
26	F	5	6.7	6.8	7.4	10.1
27	F	5	6.8	6.9	7.6	9.1
28	F	5	7.3	7.4	8.1	11.1
29	F	5	7.3	7.4	8.3	9.5
30	F	5	7.8	7.9	8.5	9.8
Mean			6.1	6.2	6.3	9.5

[1]Ethnicity codes are: 2=African American, 4=Hispanic, and 5=Caucasian

*Indicates a student with a learning disability

Table 3

Grade level scores on standardized decoding test for students with learning disabilities in the experimental group and their matched peers in the control group

Experimental Group					Control Group				
Student #	Ethnicity[1]	Gender	Pre	Post	Student #	Ethnicity[1]	Gender	Pre	Post
1	2	M	5.8	8.7	12	2	M	6.7	6.7
2	2	M	6.8	10.8	13	2	M	7.3	7.4
3	4	M	4.1	8.1	14	4	M	5.5	3.8
4	5	M	2.7	8.1	15	5	M	5.1	5.7
5	5	M	4.4	9.1	16	5	M	5.6	5.9
6	5	M	5.4	7.4	17	5	M	6.5	7.7
7	5	M	5.9	10.1	18	5	M	6.8	8.5
8	2	F	2.7	6.5	19	2	F	5.1	4.6
9	4	F	4.9	5.7	20	4	F	4.9	5.7
10	5	F	5.1	10.8	21	5	F	5.7	5.7
11	5	F	5.8	11.9	22	5	F	6.1	7.1
Mean			4.9	8.8				5.9	6.3

[1]Ethnicity codes: 2=African American, 4=Hispanic, and 5=Caucasian

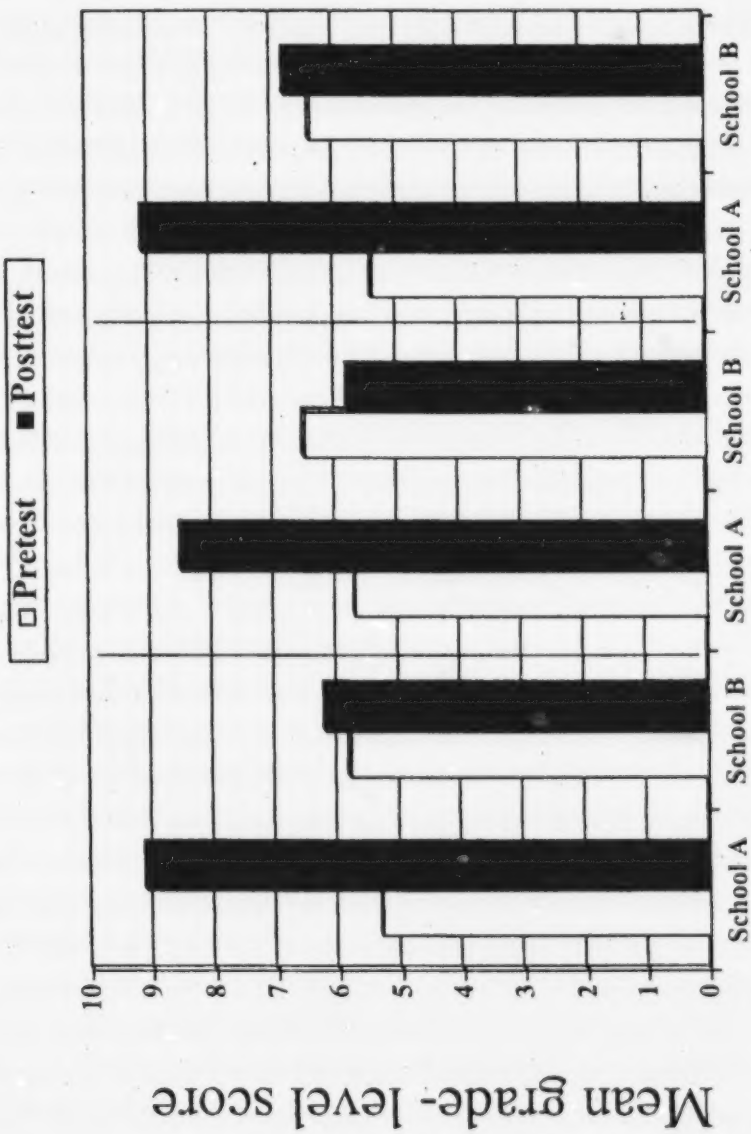

Figure 1. Mean decoding scores for high-school male students.

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